REMARKS

Claims 4-20, 22-41 and 44-51 are pending in the application. Claims 1-3, 21 and 42-43 were previously cancelled and claims 17, 20, 25 and 46 were previously withdrawn pursuant to a species restriction.

Applicants acknowledge that the arguments submitted on August 10, 2007 in response to the April 12, 2007 Office action were considered but were deemed moot in view of the new grounds of rejection.

Claims 4-16, 18-19, 22-24, 26-41, 44-45 and 47-51 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,711,354 ("Siegele et al.") in view of U.S. Patent No. 4,859,375 ("Lipisko et al."). The Examiner asserts that Siegele et al. teach several elements of the claimed invention, but acknowledges that Siegele et al. fail to teach the use of load cells. Office Action, p. 2. However, the Examiner also asserts that Lipisko et al. teach that "the use of load cells is an art recognized equivalent to the level sensors such as those used in Siegele..." Office Action, p. 2. The Examiner concludes that "it would have been obvious...to provide the system of Siegele with load cells in lieu of level sensors...because Lipisko teaches that load cells are an art recognized equivalent that will function equally well in a chemical delivery system." Office Action, p. 2. Applicants respectfully traverse the rejection and seek favorable reconsideration in view of the following remarks.

Independent claim 4 claims *inter alia* a liquid chemical delivery system comprising "a buffer reservoir with a chemical output, a main reservoir capable of receiving chemical from the supply container, a reservoir valve connecting the buffer reservoir to the main reservoir, [and] a load cell coupled to the main reservoir and to the controller..." Independent claim 7 is substantially identical to independent claim 4 except that claim 7 claims that the load cell is coupled to the *buffer* reservoir and the controller and operable to weigh the liquid in the *buffer* reservoir.

The Examiner asserts that Siegele et al. teach "a chemical delivery system including a replaceable bulk supply 220 that refills reservoirs 30...that can be used with an intermediate buffer reservoir 200...with attached controls...substantially as claimed..." Office Action, p. 2. The Examiner appears to be asserting that replaceable bulk supply 220 is a "supply container," reservoir 30 is a "main reservoir" and modified ampule 200 is a "buffer reservoir" as claimed in

independent claims 4 and 7. Applicants respectfully disagree with the Examiner's assertions in view of the following remarks.

Siegele et al. teach a high purity chemical refill system. Col. 8, Ln 41-51. During normal operation, a refillable ampule 30, 200 delivers high purity chemical to semiconductor equipment. Col. 8, Ln 54-57; Col. 31, Ln 44-52. The ampule 30, 200 is refilled by a bulk container 20, 220, which is periodically replaced when the "BULK EMPTY" signal is triggered. Col. 12, Ln 40-56; Col. 20, Ln 60-61; Col. 21, Ln 38-48; Col. 31, Ln 43, 59-62; Col. 37, Ln 44-46. Notably, depending upon the application (i.e. TEOS vs. TMB, TEB, TEPO or TMP from an AMAT P5000 PECVD unit), Siegele et al. teach either an ampule 30 or a modified rectangular purge style dopant ampule 200. Col. 31, Ln 13-30; *See* FIGS 1 and 30. Moreover, Siegele et al. teach that "[b]ulk refill system 218 operates essentially in the same manner as the embodiment illustrated in FIG. 1." Col. 31, Ln 44-45; FIGS 1, 30. Indeed, Siegele et al. teach that "FIG. 30 illustrates...an automatic bulk refill system 218 for refilling a modified rectangular purge style dopant ampule 200...[that] can be refilled from remote bulk container 220." Col. 31, Ln 13-21. Applicants respectfully submit that Siegele et al. fail to teach or even suggest an embodiment where ampule 30 is used simultaneously or in conjunction with modified ampule 200 as suggested by the Examiner. Indeed, Siegele et al. fail to teach or even suggest a liquid chemical delivery system comprising "a buffer reservoir..., a main reservoir...[and a] supply container..." as claimed in independent claims 4 and 7. Similarly, Lipisko et al. fail to teach or even suggest a liquid chemical delivery system comprising "a buffer reservoir..., a main reservoir...[and a] supply container..." as claimed in independent claims 4 and 7. Indeed, Lipisko et al., similar to Siegele et al., teach only a refill reservoir 102 which is designed to replenish a bubbler 170 with chemical. Col. 8, Ln 13-17; Col. 10, Ln 23-25; FIG. 1. Moreover, not only do Siegele et al. and Lipisko et al. fail to teach both a main reservoir and a buffer reservoir, but they also fail to teach or even suggest "a buffer reservoir, a main reservoir capable of receiving chemical from the supply container, [and] a reservoir valve connecting the buffer reservoir to the main reservoir..." Accordingly, even if Siegele et al. were combined with Lipisko et al., the combination would not achieve the invention as claimed in independent claims 4 and 7.

In addition, Siegele et al. teach away from a "load cell" as claimed in independent claims 4 and 7 and from Lipisko et al. Siegele et al. teach that semiconductor manufacturers, to avoid problems with optical and capacitance probe sensors, "have used...redundant level sensors to

minimize the impact of sensor malfunctions, used other level sensor types..., employed timed refill, or employed measured refill of only a small fixed volume or *measured mass* of chemical." Col. 4, Ln 7-12; Emphasis added. Siegele et al. also teach that "[t]hese refill systems suffer...performance problems arising from: non-linearity of alternate sensor technology, uncertainty of the refill volume, the lack of a positive shut-off of the chemical fill, the risk of malfunction due to maladjustment of system components or the lack of level monitoring of the bulk chemical source." Col. 4, Ln 13-19. Moreover, Siegele et al.'s solution to the problems posed by the prior art is a metallic level sensor 39. *See*, for example, Col. 5, Ln 26-51; Col. 9, Ln 33-34; Col. 10, Ln 19-48; Cols 13-14, Ln 14-36. Accordingly, Siegele et al. teach away from "a level sensor" as claimed in independent claims 4 and 7. In addition, in contrast to Lipisko et al. who teach that "any level sensing device may be used..." (*See* Col. 4, Ln 44), as discussed above, Siegele et al. describe the problems with refill systems having alternative sensor technologies including mass measuring devices (*See* Col. 4, Ln 12), the primary solution to which is a metallic level sensor 39. Accordingly, Siegele et al. also teach away from Lipisko et al. Thus, independent claims 4 and 7 are not rendered obvious by Siegele et al. either alone or in combination with Lipisko et al. and Applicants respectfully request withdrawal of the rejections to claims 4 and 7.

Claims 5-6 depend from independent claim 4 and claims 8-9 depend from independent claim 7, thus, for at least the reasons set forth above with respect to independent claims 4 and 7, dependent claims 5-6 and 8-9 are similarly not rendered obvious by Siegele et al. either alone or in combination with Lipisko et al. Thus, Applicants respectfully request withdrawal of the rejections to claims 5-6 and 8-9. In addition, Siegele et al., either alone or in combination with Lipisko et al., fail to achieve the invention as claimed in dependent claims 5-6 and 8-9. Dependent claims 5 and 8 claim that "the controller is adapted to send a signal to the gas valve to permit gas to flow from the gas source to the main reservoir when liquid is delivered from the chemical output and to send a signal to the gas valve to generate a vacuum in the main reservoir when the main reservoir is refilled from the supply container." Siegele et al. teach that the system has two modes of operation: a normal process operation mode and a refill mode. Col. 8, Ln 52-54. During normal operation, the high purity chemical "is supplied under pressure to some CVD reactors by an inert gas such as He." Col. 9, Ln 51-53. "Bulk container 20 is continuously pressurized with an inert gas...; thus, when valve 42 is opened, inert gas forces

the...chemical from bulk container 20 through refill line 44 and to the ampule 30." Col. 10, Ln 15-19. Moreover, "inert gas is supplied through the inlet valve 64" and into bulk canister 20. Col. 13, Ln 3-4; FIGS 1, 30 and 34. Because of this, during the refill mode, "the ampule 30 may need to be depressurized and a vacuum pulled to ease the high purity...chemical transfer process." Col. 9, Ln 51-56. After this depressurization step, "the vacuum/pressurization valve 37 is closed...[and] [i]nlet valve 38 is...opened to allow the flow of high purity...chemical into ampule 30." Col. 9, Ln 59-62. Notably, the vacuum is not applied (i.e. valve 37 is closed) when the high purity chemical flows into the ampule. Thus, Siegele et al. fail to teach that "the controller is adapted to send a signal to the gas valve to permit gas to flow from the gas source to the main reservoir...*and* to send a signal to the gas valve to generate a vacuum in the main reservoir *when* the main reservoir is refilled from the supply container" as claimed in dependent claims 5 and 8. Emphasis added. Accordingly, for these further reasons, Siegele et al. either alone or in combination with Lipisko et al. fail to achieve the invention as claimed in dependent claims 5 and 8.

Dependent claims 6 and 9 claim that "the controller closes the reservoir valve when the main reservoir is refilled and liquid is delivered from the buffer reservoir such that the buffer reservoir under goes no negative pressure from the vacuum in the main reservoir." As discussed above with respect to independent claims 4 and 7, Siegele et al. and Lipisko et al. fail to teach or even suggest a system having *both* a main reservoir and a buffer reservoir. Moreover, Siegele et al. and Lipisko et al. fail to teach a reservoir valve and thus fail to teach that "the controller closes the reservoir valve" as claimed in dependent claims 6 and 9. In addition, Siegele et al. and Lipisko et al. fail to teach that "the controller closes the reservoir valve when the main reservoir is refilled and liquid is delivered from the buffer reservoir" as claimed in dependent claims 6 and 9. Furthermore, Siegele et al. and Lipisko et al. simply fail to teach that "the buffer reservoir under goes no negative pressure from the vacuum in the main reservoir" (Emphasis added) as claimed in dependent claims 6 and 9. Accordingly, for these further reasons dependent claims 6 and 9 are not rendered obvious by Siegele et al. either alone or in combination with Lipisko et al.

Independent claim 10 claims *inter alia* a liquid chemical delivery system for use with a supply container having "a buffer reservoir..., a main reservoir capable of receiving chemical from the supply container, a reservoir valve connecting the buffer reservoir to the main reservoir, a first load cell coupled to the main reservoir and to the controller...; a second load cell coupled

to the buffer reservoir and to the controller...; and a means for delivering the liquid from the chemical output and refilling the main reservoir with chemical when demanded by the controller based on signals from the first and second load cells." As discussed above, both Siegele et al. and Lipisko et al. fail to teach both a main reservoir and a buffer reservoir. Similarly, Siegele et al. and Lipisko et al. fail to teach "a reservoir valve connecting the buffer reservoir to the main reservoir..." Thus, even if Siegele et al. were combined with Lipisko et al., the combination would not achieve the invention as claimed in independent claim 10. Moreover, Siegele et al. fail to teach or even suggest "a first load cell coupled to the main reservoir...; [and] a second load cell coupled to the buffer reservoir..." As discussed above with respect to independent claims 4 and 7, Siegele et al. teach away from load cells and from Lipisko et al. Accordingly, Applicants respectfully submit that independent claim 10 is not rendered obvious by Siegele et al. either alone or in combination with Lipisko et al. and request withdrawal of the rejections to independent claim 10.

Claims 11 and 12 depend from independent claim 10 and thus for at least the reasons set forth above, are not rendered obvious by Siegele et al. either alone or in combination with Lipisko et al. In addition, claims 11 and 12 are also not rendered obvious by Siegele et al. either alone or in combination with Lipisko et al. for at least the reasons discussed above with respect to claims 5 and 8 and 6 and 9, respectively. Thus, Applicants respectfully request withdrawal of the rejections to claims 11-12.

Independent claim 13 claims a liquid chemical delivery system having "an upstream delivery...portion comprising a main reservoir..., a first measuring means for measuring the amount of...chemical contained therein...; downstream delivery...portion comprising a buffer reservoir having an optional second measuring means located intermediate the main reservoir and a delivery site and for receiving the...chemical from the main reservoir and delivering the...chemical to the delivery site where the downstream delivery portion is adapted to deliver...chemical to the delivery site while the main reservoir refill means refills the main reservoir..." As discussed above, Siegele et al. and Lipikso et al. fail to teach or even suggest an embodiment with *both* a main reservoir and a buffer reservoir. Moreover, Siegele et al. and Lipisko et al. fail to teach or even suggest a downstream delivery portion having a buffer reservoir for receiving the chemical from the main reservoir. Similarly, Siegele et al. and Lipisko et al. fail to teach a downstream delivery portion adapted to deliver chemical to a

delivery site while the main reservoir is being refilled. Thus, even if Siegele et al. were combined with Lipisko et al., the combination would not achieve the invention as claimed in independent claim 13. Accordingly, Applicants respectfully request withdrawal of the rejections to independent claim 13.

Dependent claims 14-20 and 22-29 depend from independent claim 13 and are thus, not rendered obvious by Siegele et al. either alone or in combination with Lipisko et al. for at least the reasons set forth above with respect to independent claim 13. Accordingly, Applicants respectfully request withdrawal of the rejections to dependent claims 14-20 and 22-29.

Independent claim 30 claims *inter alia* a liquid chemical delivery system having a logic device coupled to the load cell(s) providing output signals to actuate a means for sealing and unsealing the buffer reservoir from the main reservoir wherein sealing corresponds to refilling the main reservoir and unsealing corresponds to not refilling the main reservoir; and a gas source supplying the main reservoir to blanket the liquid chemical therein. As discussed above, Siegele et al. and Lipisko et al. fail to teach or even suggest an embodiment with *both* a main reservoir and a buffer reservoir. Similarly, Siegele et al. and Lipisko et al. simply fail to teach a "means for sealing and unsealing the buffer reservoir from the main reservoir." Thus, even if Siegele et al. could be combined with Lipisko et al. the combination would not achieve the invention as claimed in independent claims 4 and 7. Moreover, as discussed above with respect to independent claims 4 and 7, Siegele et al. teach away from load cells and from Lipisko et al. Thus, Applicants respectfully request withdrawal of the rejections to independent claim 30.

Independent claim 31 claims a liquid chemical delivery system having a multi-reservoir load cell assembly including a main reservoir with a load cell; a buffer reservoir; means for sealing and unsealing the buffer reservoir from the main reservoir; means for receiving a first liquid chemical in the main reservoir until the multi-reservoir load cell assembly determines the main reservoir has a sufficient amount of the first liquid chemical; means for receiving a second liquid chemical in the main reservoir until the multi-reservoir load cell assembly determines the main reservoir has a sufficient amount of the second liquid chemical wherein the system is adapted to transport the first liquid chemical and the second liquid chemical from the main reservoir to the buffer reservoir. Applicants respectfully submit that independent claim 31 is not rendered obvious by Siegele et al. either alone or in combination with Lipisko et al. for at least the reasons set forth above with respect to independent claims 4, 7 and 30 and dependent claims

5 and 8. Accordingly, Siegele et al. fail either alone or in combination with Lipisko et al. fail to achieve the invention as claimed. Thus, Applicants respectfully request withdrawal of the rejection to independent claim 31.

Independent claim 32 claims *inter alia* a liquid chemical delivery system comprising "a multi-reservoir load cell assembly, including a main reservoir with a load cell; a buffer reservoir; means for sealing and unsealing the buffer reservoir from the main reservoir...; and wherein the system is adapted to transport the first liquid chemical and the second liquid chemical from the main reservoir to the buffer reservoir." Applicants respectfully submit that Siegele et al. and Lipisko et al. fail to teach *both* a main reservoir and a buffer reservoir as claimed in independent claim 32. Similarly, Siegele et al. and Lipisko et al. fail to teach or even suggest a "means for sealing and unsealing the buffer reservoir from the main reservoir...wherein the system is adapted to transport the first liquid chemical and the second liquid chemical from the main reservoir to the buffer reservoir" as claimed in independent claim 32. Moreover, as discussed above with respect to independent claims 4 and 7, Siegele et al. teach away from a load cell and from Lipisko et al. Accordingly, Applicants respectfully submit that Siegele et al. either alone or in combination with Lipisko et al. does not achieve the invention as claimed in independent claim 32. Thus, Applicants respectfully request withdrawal of the rejections to independent claim 32.

Dependent claims 33-34 depend from independent claim 32, thus for at least the reasons set forth above with respect to independent claim 32, dependent claims 33-34 are not rendered obvious by Siegele et al. either alone or in combination with Lipisko et al. In addition, dependent claim 33 is not rendered obvious by Siegele et al. in combination with Lipisko et al. for at least the reasons set forth above with respect to dependent claims 5 and 8. Moreover, dependent claim 34 is not rendered obvious by Siegele et al. either alone or in combination with Lipisko et al. for at least the reasons set forth above with respect to dependent claims 6 and 9 and independent claim 30. Accordingly, Applicants respectfully request withdrawal of the rejections to dependent claims 33-34.

Independent claim 35 claims *inter alia* a chemical delivery system having "a multi-reservoir load cell assembly comprising a main reservoir capable of fluid communication with a buffer reservoir and a first load cell for weighing the assembly and generating an output signal indicative of the weight; and means, responsive to the output signal, for evacuating the main

reservoir and adjusting pressure in the buffer reservoir and for calculating the amount of chemical in the assembly." As discussed above with respect to independent claims 4 and 7, Siegele et al. and Lipisko et al. fail to teach *both* a main reservoir and a buffer reservoir. Similarly, Siegele et al. and Lipisko et al. fail to teach "means...for evacuating the main reservoir and adjusting pressure in the buffer reservoir..." as claimed in independent claim 35. In addition, Siegele et al. simply fail to teach "a first load cell for weighing the assembly..." Moreover, as further discussed above with respect to independent claims 4 and 7, Siegele et al. teach away from a load cell and from Lipisko et al. Accordingly, Siegele et al. either alone or in combination with Lipisko et al. fail to achieve the invention as claimed in independent claim 35.

Dependent claims 36-40 depend from independent claim 35, thus, for at least the reasons set forth above with respect to independent claim 35, dependent claims 36-40 are not rendered obvious by Siegele et al. either alone or in combination with Lipisko et al. Accordingly, Applicants respectfully request withdrawal of the rejections to claims 35-40.

Independent claim 41 claims a method for refilling a multi-reservoir load cell assembly including: a) isolating the main reservoir from fluid communication with the buffer reservoir; b) reducing the gas pressure in the main reservoir to draw the chemical into the main reservoir until the chemical rises to a predetermined amount; c) increasing the gas pressure in the main reservoir; and d) opening fluid communication between the main reservoir and the buffer reservoir to allow the chemical in the main reservoir to flow into the buffer reservoir. As discussed above with respect to independent claims 4 and 7, Siegele et al. and Lipisko et al. fail to teach *both* a main reservoir and a buffer reservoir. Similarly, Siegele et al. and Lipisko et al. fail to teach "isolating the main reservoir from fluid communication with the buffer reservoir" as claimed in independent claim 41. In addition, as discussed above with respect to dependent claims 5 and 8, Siegele et al. teach that the system has two modes of operation: a normal process operation mode and a refill mode. Col. 8, Ln 52-54. During normal operation, the high purity chemical "is supplied under pressure to...CVD reactors by an inert gas..." Col. 9, Ln 51-53. "Bulk container 20 is continuously pressurized with an inert gas...; thus, when valve 42 is opened, inert gas forces the...chemical from bulk container 20 through refill line 44 and to the ampule 30." Col. 10, Ln 15-19. Moreover, "inert gas is supplied through the inlet valve 64" and into bulk canister 20. Col. 13, Ln 3-4; FIGS 1, 30 and 34. Because of this, during the refill mode, "the ampule 30 may need to be depressurized and a vacuum pulled to ease the high

purity...chemical transfer process." Col. 9, Ln 51-56. After this depressurization step, "the vacuum/pressurization valve 37 is *closed*...[and] [i]nlet valve 38 is...opened to allow the flow of high purity...chemical into ampule 30." Col. 9, Ln 59-62; Emphasis added. Notably, the vacuum is not applied (i.e. valve 37 is closed) when the high purity chemical flows into the ampule. Accordingly, Siegele et al. merely teach depressurizing the ampule 30 before transfer of the chemical by pressure (*See* Col. 10, Ln 15-19) and fail to teach "reducing the gas pressure in the main reservoir *to draw the chemical into the main reservoir until the chemical rises to a predetermined amount*" as claimed in independent claim 41. Emphasis added. Moreover, Siegele et al. simply fail to teach "opening fluid communication between the main reservoir and the buffer reservoir to allow the chemical in the main reservoir to flow into the buffer reservoir" as claimed in independent claim 41. Accordingly, even if Siegele et al. were combined with Lipisko et al., the combination would not achieve the invention as claimed in independent claim 41.

Independent claim 44 claims a method for refilling a multi-reservoir load cell assembly including closing the valve connecting the main reservoir outlet and the buffer reservoir inlet to isolate the main reservoir from fluid communication with the buffer reservoir; opening the valve connecting the main reservoir gas inlet and the buffer reservoir gas inlet to evacuate the main reservoir to draw liquid chemical into the main reservoir until the liquid chemical rises to a predetermined level; and opening the valve connecting the main reservoir outlet and buffer reservoir inlet to allow the liquid chemical in the main reservoir to flow into the buffer reservoir. Applicants respectfully submit that independent claim 44 is not rendered obvious by Siegele et al. either alone or in combination with Lipisko et al. for at least the reasons set forth above with respect to independent claims 4, 7 and 41 and dependent claims 5 and 8. Accordingly, Applicants respectfully request withdrawal of the rejection to independent claim 44.

Independent claim 45 claims a liquid chemical delivery system comprising "a multi-reservoir load cell assembly, including a main reservoir, a buffer reservoir, and at least one load cell; a logic device coupled to the load cell providing output signals to actuate...a vacuum generator for evacuating the main reservoir to draw liquid chemical from the chemical supply source into the main reservoir." Applicants respectfully submit that independent claim 45 is not rendered obvious by Siegele et al. either alone or in combination with Lipisko et al. for at least the reasons set forth above with respect to independent claims 4, 7 and 41 and dependent claims

5 and 8. In addition, Applicants respectfully submit that neither Siegele et al. nor Lipisko et al. teach a "multi-reservoir load cell assembly, including a main reservoir, a buffer reservoir, *and* at least one load cell" as claimed in independent claim 45. Emphasis added. Accordingly, independent claim 45 is not rendered obvious by Siegele et al. either alone or in combination with Lipisko et al. Thus, Applicants respectfully request withdrawal of the rejection to independent claim 45.

Dependent claims 46-50 depend from independent claim 45 and thus claims 46-50 are not rendered obvious by Siegele et al. either alone or in combination with Lipisko et al. for at least the reasons set forth above with respect to independent claim 45. Accordingly, Applicants respectfully request withdrawal of the rejections to claims 45-50.

Independent claim 51 claims a system for combining a first and second liquid chemical and delivering the combination including "a multi-reservoir load cell assembly, including a main reservoir with a load cell; a buffer reservoir; a means for sealing and unsealing the buffer reservoir from the main reservoir; means for supplying a first liquid chemical to the main reservoir until the multi-reservoir load cell assembly determines the main reservoir has a sufficient amount of the first liquid chemical; a means for supplying a second liquid chemical to the main reservoir until the multi-reservoir load cell assembly determines the main reservoir has a sufficient amount of the second liquid chemical wherein the system is adapted to transport the combination of the first liquid chemical and the second liquid chemical from the main reservoir to the buffer reservoir." Applicants respectfully submit that independent claim 45 is not rendered obvious by Siegele et al. either alone or in combination with Lipisko et al. for at least the reasons set forth above with respect to independent claims 4, 7, 30 and 41 and dependent claims 5 and 8. Accordingly, Applicants respectfully request withdrawal of the rejection to independent claim 51.

In view of the foregoing remarks, Applicants respectfully submit that claims 4-16, 18-19, 22-24, 26-41, 44-45 and 47-51 are not rendered obvious by Siegele et al. either alone or in combination with Lipisko et al. and that the claims are in condition for allowance. Accordingly, Applicants respectfully request withdrawal of the rejections to the claims and that the application be promptly passed to issue.

Respectfully submitted,

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